INTISARI

Penelitian ini bertujuan untuk mendeteksi dan menganalisis anomali pada pola batik berwarna menggunakan metode segmentasi berbasis *Convolutional Neural Network* (CNN). Tiga jenis cacat yang menjadi fokus penelitian ini meliputi garis pecah, warna keluar pola, dan warna masuk pola. Dua model utama yang diuji adalah YOLOv8-seg, sebagai metode *one-stage detector*, dan Mask R-CNN, sebagai metode *two-stage detector*. Dataset penelitian terdiri dari 462 citra batik berukuran 640×640 piksel yang berasal dari Batik Butimo, yang telah dianotasi secara manual menggunakan alat *polygon* pada platform Roboflow. Proses *pre-processing* dilakukan dengan menggunakan *Adaptive Equalization Contrast* untuk meningkatkan kualitas citra, sementara teknik augmentasi data seperti flipping, cropping, rotasi, dan penyesuaian warna diterapkan untuk menambah variasi dan mengurangi risiko overfitting. Proses pelatihan model memanfaatkan *pretrained weights* dan mekanisme *early stopping* untuk memastikan konvergensi yang optimal. Evaluasi kinerja model dilakukan menggunakan metrik *Precision*, *Recall*, dan *mean Average Precision* (mAP) pada ambang IoU 0,50 dan rentang 0,50–0,95. Hasil penelitian menunjukkan bahwa model YOLOv8-seg memberikan performa terbaik dengan nilai mAP@50 sebesar 0,300 dan mAP@50–95 sebesar 0,127, sementara Mask R-CNN hanya mencapai mAP@50 sebesar 0,176 dan mAP@50–95 sebesar 0,027. Berdasarkan hasil ini, YOLOv8-seg terbukti lebih unggul dalam mendeteksi dan melakukan segmentasi cacat pada batik berwarna dengan variasi bentuk dan ukuran cacat, serta efisiensi pelatihan yang lebih baik. Kesimpulannya, model YOLOv8-seg menunjukkan tingkat akurasi dan presisi yang lebih tinggi dibandingkan Mask R-CNN, sehingga dapat dijadikan acuan dalam pengembangan sistem inspeksi otomatis berbasis visi komputer untuk meningkatkan kualitas dan efisiensi produksi batik di masa depan.

Kata kunci: batik, deteksi anomali, Convolutional Neural Network, YOLOv8-seg, Mask R-CNN.

ABSTRACT

This study aims to detect and analyze anomalies in colored batik patterns using a segmentation method based on Convolutional Neural Networks (CNN). The research focuses on three primary defect types: broken lines, color bleeding outside the pattern, and color intrusion into the pattern. Two models were employed for comparison, namely YOLOv8-seg as a one-stage detector and Mask R-CNN as a two-stage detector. The dataset used in this study consists of 462 images of Batik Butimo with a resolution of 640×640 pixels, which were manually annotated using the polygon tool on the Roboflow platform. The preprocessing stage was performed using Adaptive Equalization Contrast to enhance image quality, while data augmentation techniques such as flipping, cropping, rotation, and color adjustment were applied to increase data diversity and reduce the risk of overfitting. The models were trained using pretrained weights and the early stopping mechanism to ensure optimal convergence. Model performance was evaluated using Precision, Recall, and mean Average Precision (mAP) metrics at IoU thresholds of 0.50 and 0.50–0.95. The results show that the YOLOv8-seg model achieved the best performance, with an mAP@50 of 0.300 and an mAP@50–95 of 0.127, while the Mask R-CNN model obtained only 0.176 and 0.027, respectively. Based on these findings, YOLOv8-seg proved to be more effective in detecting and segmenting batik pattern anomalies across various defect sizes and shapes, with better training efficiency. The conclusion of this study is that YOLOv8-seg demonstrates higher accuracy and precision compared to Mask R-CNN in detecting batik pattern defects, making it a suitable reference for developing automated computer vision–based inspection systems to improve the quality and efficiency of batik production in the future.

Keywords : batik, anomaly detection, Convolutional Neural Network, YOLOv8-seg, Mask R-CNN.